



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,618	01/30/2008	Timothy John Hughes	038871.58287US	5012

23911 7590 05/03/2011
CROWELL & MORING LLP
INTELLECTUAL PROPERTY GROUP
P.O. BOX 14300
WASHINGTON, DC 20044-4300

EXAMINER

LANDEROS, IGNACIO

ART UNIT	PAPER NUMBER
----------	--------------

3785

MAIL DATE	DELIVERY MODE
-----------	---------------

05/03/2011

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/594,618

Applicant(s)

HUGHES ET AL.

Examiner

IGNACIO LANDEROS

Art Unit

3785

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 January 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) 10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 September 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 09/28/2006.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

1. The amendment filed 9/28/2006 has been entered. Claim 10 is cancelled.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the “cooling surface provided with fins”, recited in claim 5, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claims 1-6, 8, and 9 are objected to because of the following informalities: the claims include multiple brackets in each reference numeral (i.e., [[(9)])] which are unnecessary. Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Xu et al. (US Patent No. 5,918,470), herein referred to as Xu.

Regarding Claim 1 and 3, Xu discloses a cooling apparatus (**See Figure 1**) comprising a removable cryogenic refrigerator (i.e., two-stage cryocooler 12) and a thermal interface (i.e., thermal interface gasket 29) between the removable cryogenic refrigerator and an article to be cooled by the cryogenic refrigerator, a thermal interface consists of a gas held in thermal contact with a cooling surface (i.e., cold head 30) of the refrigerator within a recondensing chamber (i.e., cavity 32), and the article (i.e., helium gas) is cooled by thermal conduction through a wall (i.e., heat sink 11) of the closed recondensing chamber. Xu discloses trapped gases contained in the thermal interface gasket will escape into the recondensing chamber (i.e., cavity 32) once the

Art Unit: 3785

refrigerator has been installed (**Column 4, Line 21-26**). In addition, the recondensing chamber is not disclosed to be vacuum sealed when the refrigerator is installed, thus at least natural gas exists in the recondensing chamber. Further, Xu teaches the radiation shield, which is in thermal communication with the first stage cooler (16), to be cooled to 55K (**Column 2, Line 61-Column 3, Line 1**). Therefore the recondensing chamber (i.e., cavity 32) must be in a temperature range of 55K to 4K (i.e., the second stage cooler temperature is 4K) (**Column 3, Line 27-30**). At 55K natural gas, helium, and other gases condense into liquids as they come in contact with heat exchanging surfaces. It is then concluded that a gas trapped inside of the recondensing chamber condenses into liquid as it comes into contact with a cooling surface (i.e., cold head 30). Inherently, the liquid will fall to the bottom of the recondensing chamber due to the force of gravity, and thus will be in contact with the bottom wall (11). Xu teaches the gravitational phenomenon on liquids in column 3, lines 33-34 and again on column 3, lines 46-47.

Regarding Claim 2, Xu discloses a cryogenic refrigerator (12) mounted within a sleeve (i.e., sleeve assembly 8, 18, 23) (**Figure 1**). The sleeve (8, 18, 23) encloses the recondensing chamber (32) (**Figure 1**). As discussed above, the recondensing chamber (32) includes trapped gases, and thus the volume within the sleeve surrounding the refrigerator forms the closed recondensing chamber.

Regarding Claim 4, Xu discloses the bottom wall (11) of the closed recondensing chamber to be in thermal contact with a further recondensing chamber (39), which

Art Unit: 3785

recondenses a cryogen gas (i.e., helium 5) (**Column 3, Line 27-33**) and is sealed from the closed recondensing chamber interface (29) (**Column 2, Line 46-51**).

Regarding Claim 5, Xu discloses the cooling surface (30) to be provided with fins (42) via thermal interface (29) and bottom wall (11) (**Figure 1**).

Regarding Claim 6, Xu discloses a cryostat (i.e., two-stage cryocooler 12) (**See Figure 1**) comprising a cryogen vessel (i.e., helium pressure vessel 4) containing a liquefied cryogen (i.e., liquid helium surface level 44), a recondenser (i.e., recondenser chamber 38) exposed to the interior of the cryogen vessel via liquid and gas helium passage 52 and 58, and the recondenser being connected to the cooling apparatus set forth in claim 1 (discussed above) (**Column 3, Line 9-20**).

Regarding Claim 7, Xu discloses an MRI system (10) (**Column 2, Line 42**) comprising superconducting windings (i.e., superconducting magnet coil assembly 60) contained within a cryogen vessel (4) (**Figure 1**).

Regarding Claim 8, Xu discloses a thermal interface (29) comprising a closed recondensing chamber (32) around a recondensing refrigerator (12) and in thermal contact with a component to be cooled through a wall (i.e., cooled superconducting windings via liquid helium condensed at the surface of wall 11) of the closed recondensing chamber, the closed recondensing chamber being filled with a gas which

Art Unit: 3785

is recondensed into a liquid by the recondensing refrigerator (discussed above in claim 1) whereby thermal contact between the recondensing refrigerator and the component is provided by recondensation of the gas via the wall (11) of the closed recondensing chamber (32) **(Figure 1)**.

Regarding Claim 9, the method limitations of claim 9 comprise the same structure as set forth in claim 1, above. A cryostat is equivalent to a cryogenic refrigerator. The cryogenic refrigerator discussed above recondenses cryogen gas (i.e., helium) generated by the heat transfer between liquid cryogen and superconducting windings (60). The walls of the recondenser (39), including the fins (42), provide recondensing surfaces and are in thermal contact with the bottom wall (11) of a closed recondensing chamber (32) of a thermal interface (29) and are exposed to the cryogen gas via helium gas passage (52) within the cryostat (i.e., helium pressure vessel 4). The recondensing surfaces are cooled by cooling the component (i.e., superconducting windings 60) through the wall (11) of the closed recondensing chamber of the thermal interface (29) **(Column 3, Line 9-35, Figure 1)**.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Pan et al. (US Patent No. 7,131,276) discloses helium cryogen disposed inside of a first recondensing chamber.

Chen, William E. (US Patent No. 5,613,367 and 5,782,095) discloses an MRI cryogenic cooling device.

Eckels et al. (US Patent No. 5,701,744) discloses an MRI cryogenic cooling device with fins on the recondensing surface.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IGNACIO LANDEROS whose telephone number is (571) 270-1875. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Judy Swann can be reached on (571) 272-7075. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Application/Control Number: 10/594,618
Art Unit: 3785

Page 8

/J J Swann/
Supervisory Patent Examiner, Art Unit 3785

/I. L./
Examiner, Art Unit 3785

,